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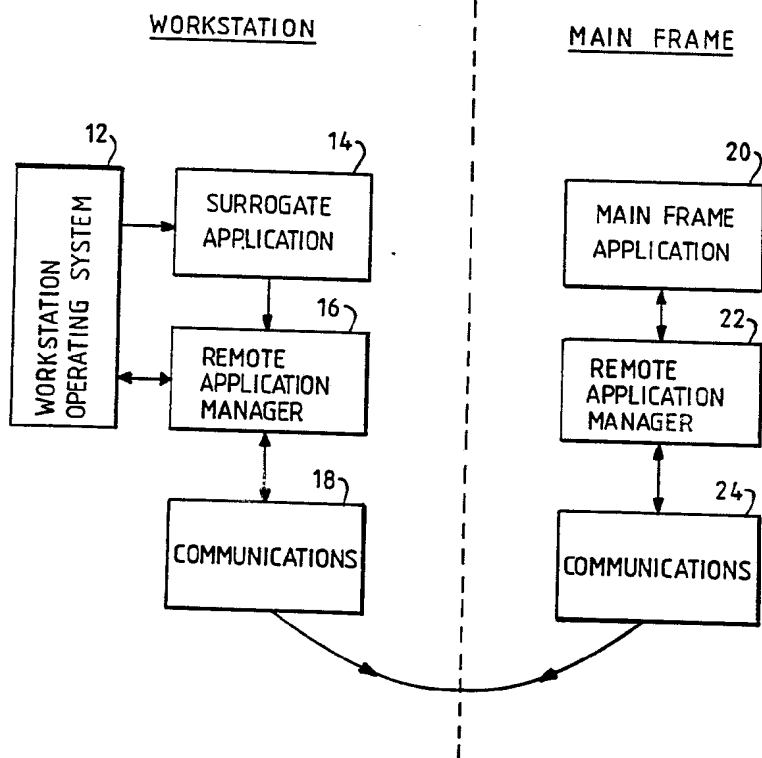
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(54) Title: WORKSTATIONS AND DATA PROCESSING NETWORK CONTAINING WORKSTATIONS

(57) Abstract

A workstation (2) and data processing network in which having an application selection mode simultaneously displaying representations of both local and remote applications (20) from which either remote or local applications may be started using a common selection procedure. When a remote application (20) is selected a surrogate application (14) is run on the workstation (2) which establishes communication with the remote processor. The provision of this common selection procedure means that the workstation (2) is easier to use.



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WORKSTATIONS AND DATA PROCESSING NETWORK CONTAINING WORKSTATIONS

This invention relates to the field of workstations, data processing networks containing workstations and to methods of operating workstations and data processing networks. More particularly, this invention relates to workstations and data processing networks using which a user may carry out data processing using local or remote applications.

There is a trend in computing to link data processors together to form data processing networks. The processors within such networks may share resources such as data storage devices or communications equipment and may also share the data processing load. Typically, each user has his own intelligent workstation which is connected to one or more mainframe computer systems.

Certain data processing applications, such as those that require a large amount of user interaction, will be best suited to being carried out locally by the local processor of the user's workstation. Other data processing applications, such as those that require a large amount of numeric processing or have shared data, will be best suited to being carried out by the remote processor of a mainframe computer system. Still further applications may be best carried out by being partially processed by the local processor and partially by the remote processor.

With the ever increasing use of computer systems by nonexperts it is desirable that the systems be as simple as possible to use.

Viewed from one aspect the present invention provides a workstation with a local processor for running local applications and a communication system for linking said workstation to at least one remote processor for running remote applications characterised in that said workstation provides an application selection mode for a user in which representations of both local and remote applications are simultaneously displayed at said workstation and when a remote application is selected

by said user a surrogate application running on said local processor establishes communication with said remote processor via said communication system, whereby selection of a remote application may be made in the same manner as selection of a local application.

The present invention thus both recognises and overcomes the problem of the additional complexity for the user that has previously been associated with workstations capable of running both local and remote applications. Prior art workstations have required that the user should start local and remote applications in different ways. The invention provides a system which has the advantage of being easier to use than prior art systems by providing a single mode and display from which all the different sorts of application may be started. Accordingly, the user need not be aware whether the application selected is local or remote and may run a plurality of such local and remote applications at any one time.

The present invention provides this function using a surrogate application which is run by the local processor when a remote application is selected. The fact that the surrogate application is run on the workstation means that the surrogate application can start running on the workstation in the same manner as a normal local application. Once the surrogate application has been activated it will undertake the necessary steps (e.g. by keystroke emulation) to activate the required remote application.

There are prior art systems in which the user may select between one of a number of different local applications by highlighting a local application name from a list of local application names. Such systems provide a way of starting local applications that is particularly easy for the user to understand and remember.

There are other prior art systems in which the user can gain access to a remote processor by entering an abbreviated title for that remote processor. These systems operate by automatically emulating the

keystrokes that the user needs to provide to gain access to that remote processor and start the remote application running. These prior art systems thus automatically provide the information such as the electronic address of the remote processor, the user's identification number and the user's password.

There have been no prior art systems in which it has been possible to select both local and remote applications from a single application selection mode in which representations of the applications are displayed.

In preferred embodiments of the present invention said communication system enables access by said workstation to a plurality of remote applications. This feature of providing a communication system capable of communicating with more than one remote application at a time has a synergistically advantageous effect when combined with the present invention. This feature means there is no need to treat remote applications differently from local applications by having to make sure that only a single remote application is running at any one time.

Another feature of preferred embodiments of the present invention is that said workstation provides a common selection procedure for starting both local and remote applications. This feature leads to the advantage that the user need only know one procedure (e.g. highlighting the desired application by manipulating a mouse) to start both sorts of application.

It will be appreciated that the representations of the applications could take a number of forms such as icons. However, a further feature of preferred embodiments of the present invention is that said common selection procedure comprises said user selecting an application from a list of applications presented to said user. Extending this procedure of selecting local applications to also include remote applications has the advantage that the users are already familiar with this way of interacting with a computer system thereby allowing less expert users

easy access to remote applications. The extension of this selection procedure to remote applications is made possible by the present invention's use of a surrogate application.

The present invention is particularly useful for use with systems using display windows. Display windows are areas of the display through which a particular application or function communicates with the user. Usually, the size and position of the windows within the displays may be varied by the user and the windows may be overlapped. Such systems provide a clear and easy to understand way in which a user may interact with a multitasking system. The present invention when combined with a windowing display provides a system for running both local and remote applications in which the user is sheltered from complications arising from the use of remote applications and provided with a simple user interface for interacting with the applications.

Viewed from a second aspect the present invention provides a method of operating a workstation having a local processor for running local applications and a communication system for linking said workstation to at least one remote processor for running remote applications characterised in that said workstation provides an application selection mode for a user in which representations of both local and remote applications are simultaneously displayed at said workstation and upon selection of a remote application by said user a surrogate application running on said local processor establishes communication with said remote processor via said communication system, whereby selection of a remote application may be made in the same manner as selection of a local application.

The present invention can also be viewed as a data processing network having workstations with the above features and a method of operating such a data processing network.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawing in which:

Figure 1 schematically illustrates an data processing network of the type in which the present invention may be embodied.

Figure 2 schematically illustrates an application selection mode and common selection procedure which can be used for both local and remote applications.

Figure 3 schematically illustrates the software structure of a program implementation of the present invention.

Figure 1 shows a data processing network comprising a plurality of workstations (2) which are directly connected via a communication system (4) to a plurality of mainframe computers (6). The workstations may also be indirectly connected to other mainframe computers (8) via the mainframe computers (6) to which they are directly connected.

The workstations (2) contain local processors for running local applications and the mainframe computers (6, 8) contain remote processors for running remote applications. It will also be clearly appreciated that an application may be distributed between local and remote processors in the sense that some of the applications functions (e.g. user interaction) are carried out locally whereas other functions (e.g. large scale numeric processing) are carried out remotely. When such a distributed application is started by a single selection it has the effect of starting both the local part application and the remote part of the application. The remote part of such a distributed application can be started in the same manner as an application that is entirely remote.

Figure 2 illustrates a selection procedure for selecting both local and remote applications. The workstation (2) displays the application selection menu (10) in the form of a pop down menu. The display also includes a number of overlapping windows (11) through which the user interacts with the various applications being run. The use of windows as a way of displaying information is well understood by users.

The application selection menu (10) presents a list of applications available to the user. Some of these applications, such as the word processor and spreadsheet, run on the local processor of the workstation (2), some, such as graphics and archive search, will run on the remote processor of a mainframe (6, 8), whereas applications such as electronic mail will run on both the local and remote processors.

The user selects an application from the list by using a mouse or manipulating the cursor keys to change the application highlighted to that which the user wishes to start. Figure 2 shows the graphics application highlighted. When the correct application is highlighted the user can press the appropriate button on the mouse or press the return key on the keyboard to select that application and start it running.

Figure 3 illustrates the software structure of an embodiment of the present invention. It will be appreciated by those skilled in the art that the individual software elements can be defined in many different ways and programmed in many different computer languages. What is important is the functions performed by the various software elements and the detailed coding of these elements is a matter of routine. It will also be clear that alternative software structures are possible.

The workstation (2) is controlled by an operating system (12) which is of the multitasking windowing type. The workstation also holds a surrogate application (14), a workstation remote application manager (16) and workstation communications program (18). The mainframe (6, 8) holds the mainframe application (20), which may wholly reside on the mainframe or be the mainframe part of a distributed application. The mainframe (6, 8) also holds a mainframe remote application manager (22) and mainframe communications program (24).

The communications programs (18, 24) are responsible for packaging, sending, receiving and checking the information flowing between the workstation (2) and the mainframe (6,8). Programs for performing the

functions of the communication handler are known in the art. The workstation remote application manager (16) is responsible for responding to the surrogate applications (14) request to start the remote application and passing messages to and from the remote application once it is started. The mainframe communications program (24) performs essentially the same function as the workstation communications program (18) and the mainframe remote application manager (22) is responsible for starting the mainframe application (20) and routing messages to and from it. The remote application managers (16, 22) are also responsible for ensuring that the routing of messages to and from the appropriate application is maintained when more than one remote application is being run at any one time.

The system operates in the following manner. When a user selects a remote application the workstation operating system (12) starts the surrogate application (14). The surrogate application (14) determines the appropriate electronic address, user identifier and password for that user on the mainframe (6, 8) that runs the requested remote application from a lookup table and passes these to the workstation remote application manager (16). The workstation communications program then establishes communication with the appropriate mainframe (6, 8) using the data passed to it by the workstation remote application handler (16). There are many known different protocols and instructions that the workstation communication handler (16) may use to establish communication and these need not be described in detail.

In the mainframe (6, 8) the mainframe communications program (24) receives the messages from the host and passes them to the mainframe remote application manager (22). The mainframe remote application manager (22) then starts the appropriate mainframe application (20) by, for example, passing the remote application the appropriate initialising parameters. Once the mainframe application (20) has been started the surrogate application is no longer required and the flow of information takes place directly along the chain formed by the other software elements.

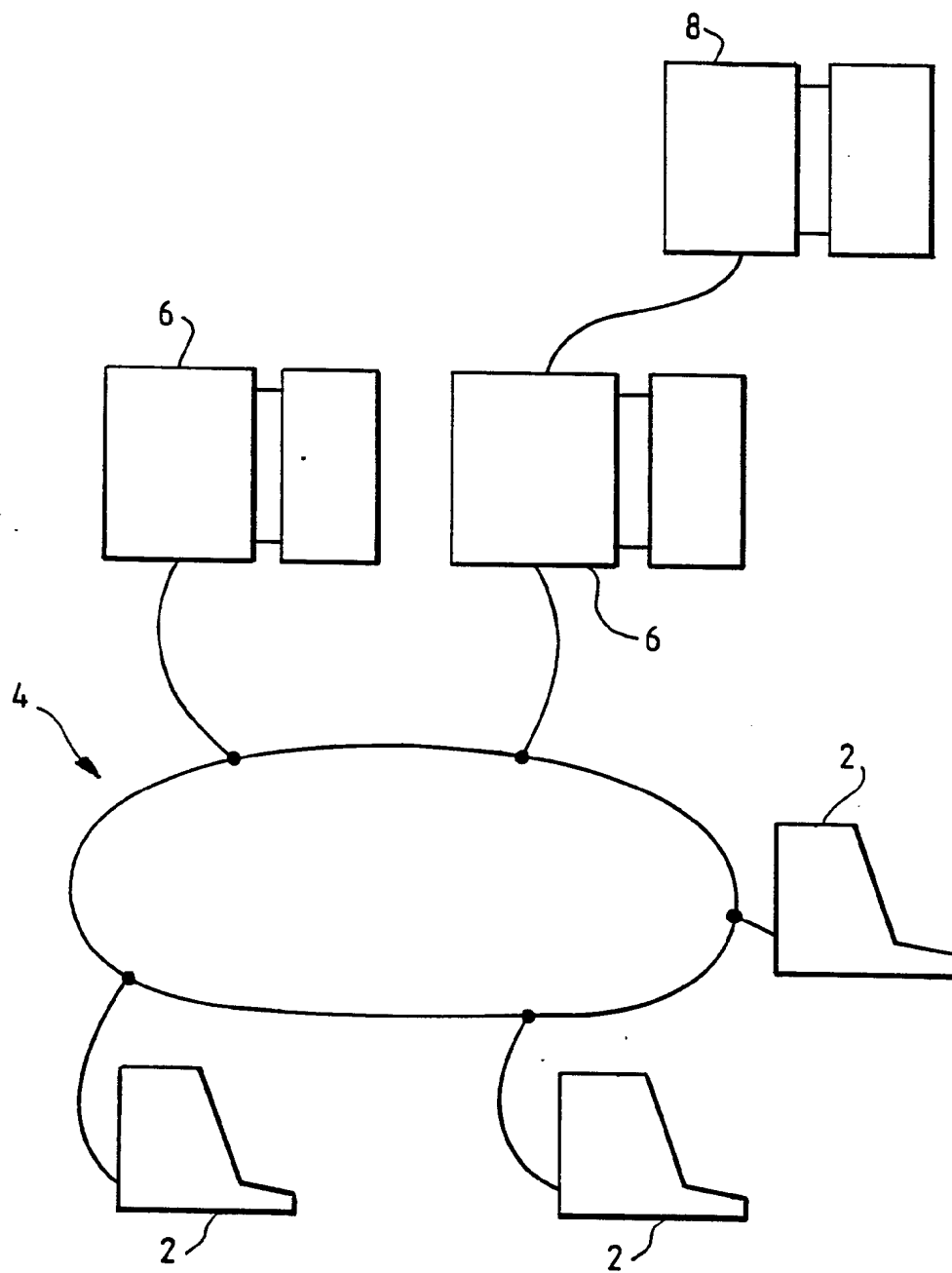
CLAIMS

1. A workstation (2) with a local processor for running local applications and a communication system (4) for linking said workstation (2) to at least one remote processor for running remote applications (20) characterised in that said workstation (2) provides a application selection mode in which representations of both local and remote applications are simultaneously displayed and when a remote application (20) is selected a surrogate application (14) running on said local processor establishes communication with said remote processor via said communication system (4).
2. A workstation as claimed in claim 1, wherein said communication system (4) enables access by said workstation (2) to a plurality of remote applications (20).
3. A workstation as claimed in claims 1 or 2, wherein said workstation (2) provides a common selection procedure for starting both local and remote applications.
4. A workstation as claimed in claim 3, wherein said common selection procedure comprises said user selecting an application from a list of applications (10) presented to said user.
5. A workstation as claimed in any preceding claim, further comprising a windowing display.
6. A data processing network having a workstation (2) as claimed in any preceding claim.
7. A method of operating a workstation (2) having a local processor for running local applications and a communication system (4) for linking said workstation (2) to at least one remote processor for running remote applications (20) characterised in that said workstation (2) provides an

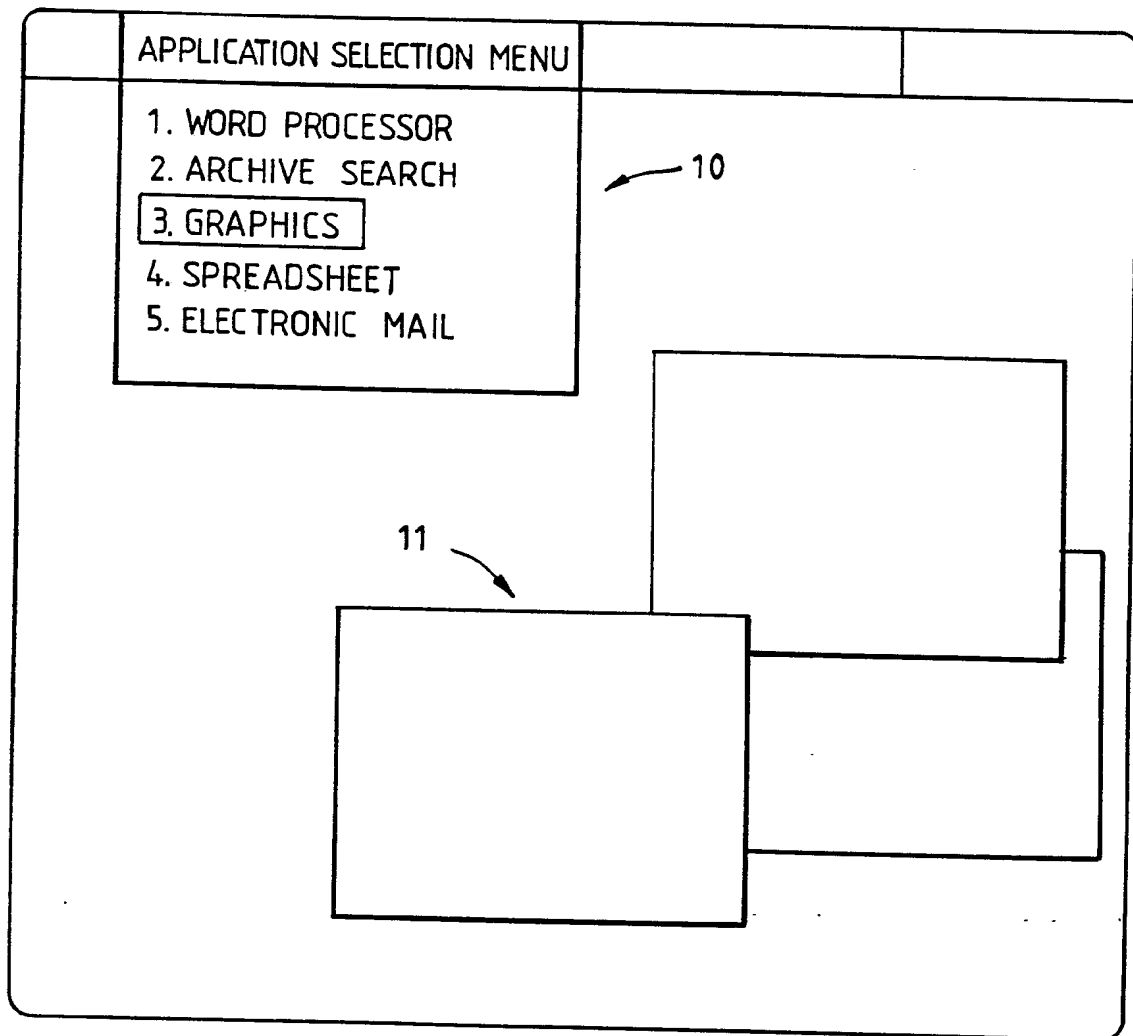
application selection mode in which representations of both local and remote applications are simultaneously displayed and upon selection of a remote application (20) a surrogate application (14) running on said local processor establishes communication with said remote processor via said communication system (4).

8. A method of operating a data processing network including a workstation (2) operating in accordance with claim 7.

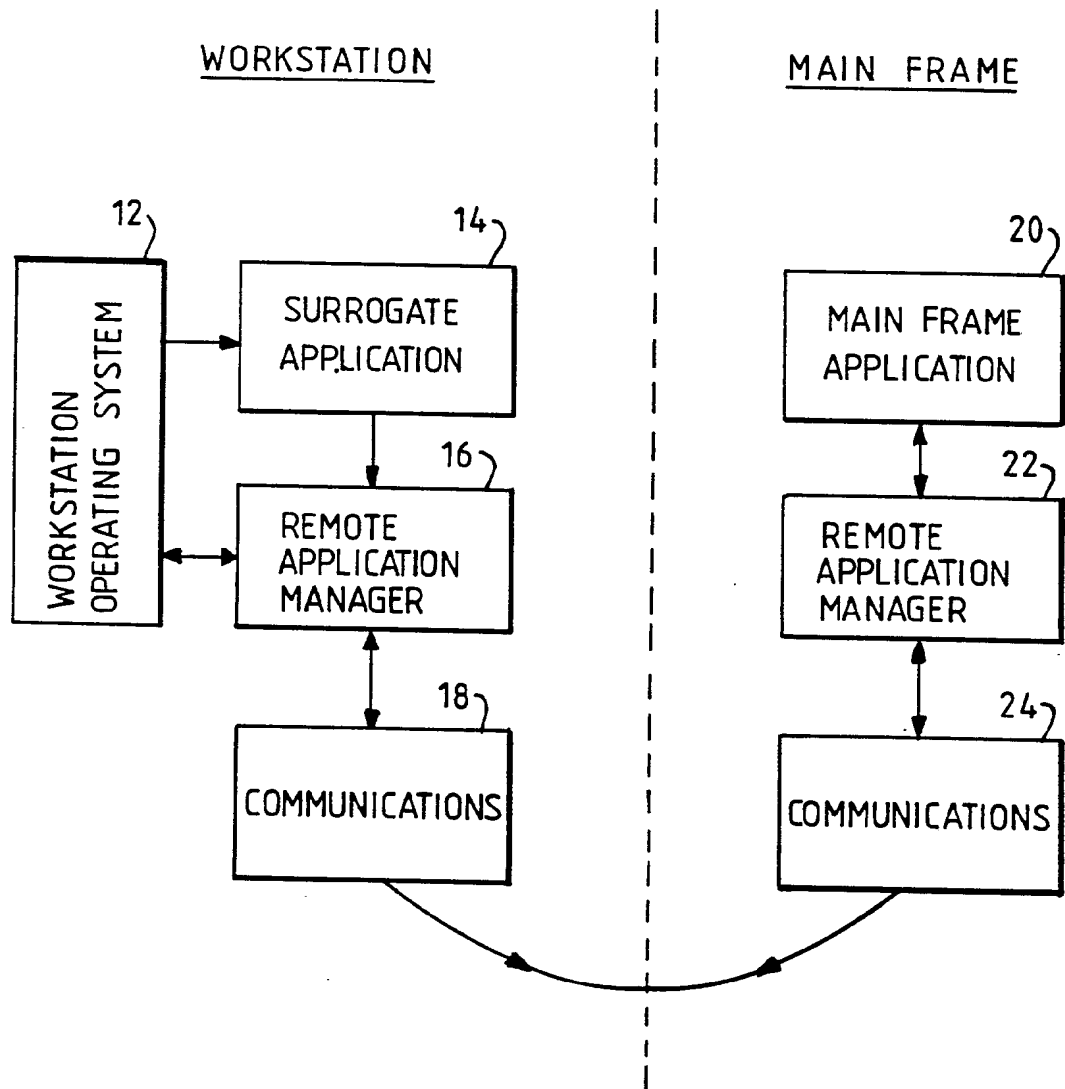
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FIG. 1

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FIG. 2

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FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB 89/00883

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁴

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC⁵: G 06 F 3/033

II. FIELDS SEARCHED

Minimum Documentation Searched ⁷

Classification System ⁸

Classification Symbols

IPC⁵ G 06 F 3

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched ⁹

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	R.W. Scheifler et al.: "X Window System", 1988, Digital Press, (Bedford, US), pages XVII-XXIX, see figure 1; page XVII, line 1 - page XXIV, line 4 --	1-8
X	Mini-Micro Systems, vol. XX, no. 7, July 1987, (Newton, MA, US), I. McCartney: "Xcellence in windows: advantages of a standard", pages 139-141, see the whole article --	1-8
A	Mini-Micro Systems, vol. XX, no. 7, July 1987, (Newton, MA, US), M. Seither: "GSS opens X window system for XENIX-based 386 workstations", pages 23-24, ./.	1-8

• Special categories of cited documents: ¹⁴

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IV. CERTIFICATION

Date of the Actual Completion of the International Search

19th March 1990

Date of Mailing of this International Search Report

27.04.90

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

[Signature]
E.W. HECK

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
	see page 23, figure; page 23, right-hand column, lines 3-7 --	
A	EP, A, 0273248 (IBM) 6 July 1988 see figure 1; column 4, lines 14-38 -----	1

GB 8900883
SA 30473

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 17/04/90
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A- 0273248	06-07-88	JP-A- 63165924	09-07-88